

of a mixed vaccine comprising 18 strains of influenza bacilli. Rabbits were immunized by six to eight injections of a mixed vaccine of ten strains of *Bacillus influenzae* grown on "chocolate medium," and killed by suspension in 0.5 per cent. phenolized salt solution. After a first injection of killed organisms, living cultures were employed. Agglutination tests at 37° C. for two hours, with the serum of immunized rabbits, also Pfeiffer's phenomena of bacteriolysis, conglutination and precipitin reactions were negative. Fixation antibodies were found in high dilutions. Agglutination tests with the same serum, incubating three to six hours at 55° C. were positive. A variation in the agglutinability of different strains of *Bacillus influenzae* suggests the existence of different groups of the organism. In the series of human cases, agglutination tests at 37° C., conglutination, opsonin, precipitin, and intradermic tests were negative. Fixation reactions were positive in 40 per cent. of vaccinated cases and in one of twenty-nine acute cases; normal and recovered cases were negative. Agglutination tests at 55° C. were positive in from three to six hours in 88 per cent. of acute cases, 46 per cent. of vaccinated and 38 per cent. of recovered cases. The few normal cases tested were uniformly negative.

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## HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF

MILTON J. ROSENAU, M.D.,

PROFESSOR OF PREVENTIVE MEDICINE AND HYGIENE, HARVARD MEDICAL SCHOOL,  
BOSTON, MASSACHUSETTS,

AND

GEORGE W. MCCOY, M.D.,

DIRECTOR OF HYGIENIC LABORATORY, UNITED STATES PUBLIC HEALTH SERVICE,  
WASHINGTON, D. C.

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**Experiments on the Nasal Route of Infection in Poliomyelitis.**—FLEXNER and AMOSS (*Jour. Exp. Med.*, 1920, xxxi, 123) state that the experiments given in their paper, notwithstanding their seeming diversity, relate to the conditions underlying the states of susceptibility and refractoriness to infection with the virus of poliomyelitis applied to the nasal mucosa. Certain monkeys are highly refractory to inoculation *via* the nares, with the virus of poliomyelitis, apparently in virtue of a power possessed by the nasal mucous membrane to destroy or otherwise render ineffective the virus applied to it. This property of the nasal mucosa appears to be distinct from any specific protective substance active upon the virus which may occur in the blood. An effective nasal mucous membrane prevents the passage of the energetically applied virus to the brain and spinal cord. The virus of poliomyelitis energetically applied to the nasal mucosa will survive for an undetermined period of time upon an ineffective, but for a relatively brief period of time upon an effective membrane. The

protective power possessed by the nasal mucosa is not in itself adequate to prevent infection with the virus introduced upon it, since slight injury to such independent structures as the meningeal-choroid plexus complex favors the passage of the virus from the nose to the central nervous organs. The normal nasal mucosa is, therefore, an invaluable defence against infection with the virus of poliomyelitis; and the number of healthy and chronic carriers of the virus is probably determined and kept down through the protective activities of this membrane. Antiseptic chemicals applied to the nasal mucosa upon which the virus has been deposited exhibit no great protective action and are of doubtful value. Indeed, it is not impossible that to the extent to which they may affect unfavorably the destructive properties of the nasal mucosa they may be even objectionable. Infection with the virus of poliomyelitis applied to the nasal mucosa under conditions favorable to the extension to the central nervous organs and multiplication there may be blocked or prevented by the injection of poliomyelitic immune serum into the blood. While the exact manner and site of attack of the immune serum upon the virus is somewhat conjectural, when all the available data are considered it seems probable that the meeting-place of the virus and immune serum is in the subarachnoid space.

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**The Physical and Economic Benefits of Treatment for Hookworm Disease.**—SCHAPIRO (*Jour. Am. Med. Assn.*, 1919, lxxxiii, 1507) states that although the life, labor and customs of the people living on the two estates studied do not differ from those that obtain generally throughout the country (Colombia), and although every effort was exercised to guard against error in conducting the study, the number of cases studied is probably insufficient to justify the drawing of conclusions that will apply to whole territories. Nevertheless, the figures may be taken as pointing toward, if not as establishing the following: There is a permanent increase in hemoglobin as a result of treatment for hookworm disease. On one farm in spite of a 15 per cent. reduction in unit pay the laborers earn 27 per cent. more. On another, where there has been no reduction in unit pay, they earn 14.6 per cent. more. The owners of one farm are cultivating 33 per cent. more coffee with the same number of laborers at a lower unit cost. In addition to the benefits mentioned one estate reports a marked reduction in morbidity and in infant mortality, and both estates report that the laborers spend less than formerly, or else spend nothing at all, for quack medicines and quack physicians to cure their infirmities.

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**The Chemotherapeutics of the Chaulmoogric Acid Series and Other Fatty Acids in Leprosy and Tuberculosis**—WALKER and SWEENEY (*Jour. Infect. Dis.*, 1920, xxvi, 238) state that chaulmoogra oil contains bactericidal substances that are about one hundred times more active than phenol. The bactericidally active substances of chaulmoogra oil are the fatty acids of the chaulmoogric series, chaulmoogric and hydnocarpic acids and possibly lower isomers of this series. The bactericidal activity of the chaulmoogric acid series is specific for the acid-fast group of bacteria and inactive against all other bacteria tested. This specific bactericidal activity against acid-fast bacteria is a function of the carbon ring structure of the molecule of the

chaulmoogric acid series, which, so far as known, is found only in chaulmoogra oil and in oils of certain plants closely related to *Taraktogenous kurzii*. The fatty acids of cod-liver oil, the salts of which constitute Roger's sodium morrhuate, used in the specific treatment of tuberculosis, do not possess the specific bactericidal activity of the chaulmoogric acid series. These facts supply a scientific basis for the use of chaulmoogra oil and its products in leprosy. Their experiments do not support the claims of Rogers for sodium morrhuate in the specific therapy of tuberculosis. The bactericidal activity of the chaulmoogric acids against all members of the acid-fast group of bacilli, together with the clinical results obtained from their use in leprosy, furnish theoretical grounds for the application of the chaulmoogrates to the therapy of tuberculosis. Experiments on animals are now in progress to determine whether or not the chaulmoogric acid series have any practical value in the chemotherapy of tuberculosis.

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**An Experimental Study of the Efficacy of Gauze Face Masks.**—KELLOGG and MACMILLAN (*Am. Jour. Public Health*, 1920, x, 34) state that gauze masks exercise a certain amount of restraining influence on the number of bacteria-laden droplets possible of inhalation. This influence is modified by the number of layers and fineness of mesh of the gauze. When a sufficient degree of density in the mask is used to exercise a useful filtering influence, breathing is difficult and leakage takes place around the edge of the mask. This leakage around the edges of the mask and the forcible aspiration of droplet-laden air through the mask is sufficient to make the possible reduction in dosage of infection not more than 50 per cent. effective. It remains for future controlled experiments on contagious disease hospitals to determine whether the wearing of masks of such texture as to be reasonably comfortable are effective in diminishing the incidence of infection. Masks have not been demonstrated to have a degree of efficiency that would warrant their compulsory application for the checking of epidemics.

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**Causes of Blindness.** The National Committee for the Prevention of Blindness has tabulated the statistics of schools and day classes for the blind for October, 1919. Among these, out of a total of 3847; 879, or 22.8 per cent., were caused by ophthalmia neonatorum. Some of the other causes of blindness in the above total are: Blind from accident, 304; progressive nearsightedness, 80; trachoma, 53; interstitial keratitis, 178; optic nerve atrophy, 394; congenital cataract, 411; and other congenital causes, 556.

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**The Eye as a Portal of Infection in Respiratory Diseases.**—CORPER and ENNIGHT (*Jour. Am. Med. Assn.*, 1920, lxxiv, 521) state that the eye must be considered as one of the important portals of infection in respiratory diseases, and, although the greater part of the infectious material entering by way of the eye is subsequently swallowed and passes into the gastro-intestinal tract, a small but definite portion of it finds its way into the larynx and trachea, where it may persist even as long as a week. In its passage from the eyes the infectious material traverses a definite channel, dependent on which eye it has

entered or into which it has been introduced. Infectious material that is ingested is far less likely to enter the respiratory tract than that entering by way of the eye or nose.

**Studies on Preservatives of Biological Products.**—NEILL (*Hygienic Laboratory Bulletin* No. 112, U. S. Public Health Service, Washington, D. C.) studied the effects of widely employed preservatives on contaminations accidentally found in biological products. He found that certain contaminating organisms were extraordinarily resistant to the killing action of phenols and of formaldehyde, though resistance to one preservative did not necessarily correspond to resistance to another. Some organisms were not killed by the maximum concentrations that may be safely used in biological products. The necessity for scrupulous care in the preparation of the products is emphasized.

**Immunization Against Typhus Fever.**—While the clinical evidence of successful transmission of typhus infection to laboratory animals is not very striking, yet when it is supported by properly conducted controls, it is trustworthy. By those who have had extensive experience with experimental typhus, the appearance of fever in the rhesus monkey ten days after inoculation of virulent typhus blood, and its continuance for ten days are accepted as postulates of successful infection. Since the classic cross-immunity experiments of Anderson and Goldberger conclusively demonstrated the identity of the causal agents of Mexican typhus and Brill's disease, and consequently the identity of the two, it follows that any claim for the successful isolation of the causal agent of Typhus exanthematicus would be best established on the basis of the production of experimental typhus and cross-immunity with virulent typhus blood. MCCOY and NEILL (*Public Health Rep.*, June 1, 1917), in carefully controlled experiments, report complete failure with the inoculation of living and killed (60° C.) cultures of *B. typhi exanthematici* (Plotz) to produce either experimental infection in the rhesus monkey, or any evidence of immunity against inoculation with virulent typhus blood. They conclude merely that they have presented evidence that a bacterial vaccine prepared from *B. typhi exanthematici* (Plotz) failed to protect monkeys against Mexican typhus.

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All communications should be addressed to—

DR. GEORGE MORRIS PIERSON, 1913 Spruce St., Philadelphia, Pa., U. S. A.